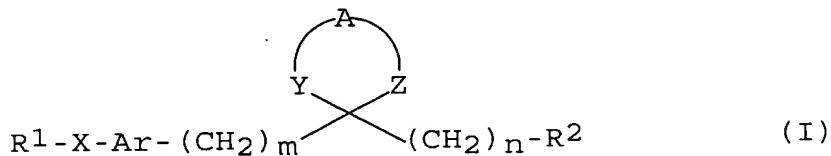


IN THE CLAIMS

The following listing of claims will replace all prior versions, listings, of claims in this application:

Claims 1-17 (Canceled).

Claim 18 (Previously Presented): A compound of the formula:



in which R¹ is lower alkyl, halogen, optionally substituted heterocyclic group or optionally substituted aryl,

R² is carboxy, protected carboxy or amidated carboxy,

Ar is thienyl,

A is ethylene or trimethylene,

X is oxa or a single bond,

Y is thia, sulfinyl or sulfonyl,

Z is methylene,

m and n are each an integer of 0 to 6, and

$$1 \leq m+n \leq 6,$$

and its salt.

Claim 19 (Previously Presented) The compound of claim 18, in which the heterocyclic group of R¹ is selected from the group consisting of:

- (1) unsaturated 3- to 8-membered, heteromonocyclic group containing 1 to 4 nitrogen atoms,
- (2) saturated 3- to 8-membered, heteromonocyclic group containing 1 to 4 nitrogen atoms,
- (3) unsaturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 sulfur atoms,
- (4) unsaturated condensed 7- to 13-membered, heterocyclic group containing 1 to 5 nitrogen atoms,
- (5) unsaturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 oxygen atoms,
- (6) saturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 oxygen atoms,
- (7) unsaturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms,
- (8) unsaturated condensed 7- to 13-membered, heterocyclic group containing 1 or 2 oxygen atoms,
- (9) unsaturated condensed 7- to 13-membered, heterocyclic group containing 1 or 2 sulfur atoms,
- (10) saturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms,
- (11) unsaturated condensed 7- to 13-membered, heterocyclic group containing 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms,
- (12) unsaturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 sulfur atoms and 1 to 3 nitrogen atoms,

(13) saturated 3- to 8-membered, heteromonocyclic group containing 1 or 2 sulfur atoms and 1 to 3 nitrogen atoms, and

(14) unsaturated condensed 7- to 13-membered, heterocyclic group containing 1 or 2 sulfur atoms and 1 to 3 nitrogen atoms, and

the aryl group of R1 is C6-C10 aryl, and further,

each of the above-mentioned heterocyclic group and aryl group are optionally substituted by a group selected from the group consisting of:

(A1) halogen,

(A2) lower alkyl,

(A3) lower alkoxy,

(A4) halo(lower)alkyl,

(A5) halo(lower)alkoxy,

(A6) lower alkenyl,

(A7) acyl,

(A8) lower alkylthio, lower alkylsulfinyl, lower alkylsulfonyl,

(A9) C6-C10 aryl,

(A10) halo(C6-C10)aryl,

(A11) hydroxy,

(A12) hydroxy(lower)alkyl, protected hydroxy(lower)alkyl,

(A13) amino,

(A14) carboxy,

(A15) protected carboxy,

(A16) nitro(lower)alkenyl,

(A17) lower alkylenedioxy,

(A18) acylamino,

- (A19) nitro,
- (A20) (C₆-C₁₀)aryl(lower)alkoxy,
- (A21) carbamoyl(lower)alkenyl optionally N-substituted by the group consisting of lower alkyl, C₆-C₁₀ aryl, lower alkoxy(C₆-C₁₀)-aryl, and halo(C₆-C₁₀)aryl,
- (A22) lower alkylaminocarbonyloxy,
- (A23) lower alkanoyloxy,
- (A24) lower alkoxy(lower)alkanoyloxy,
- (A25) lower alkoxycarbonyloxy,
- (A26) lower alkenoyloxy optionally substituted by heterocyclic group of the above (1) to (14),
- (A27) lower cycloalkanecarbonyloxy,
- (A28) lower alkoxy substituted by the group consisting of carboxy, protected carboxy, lower alkanoyl, lower cycloalkanecarbamoyl, and lower alkylcarbamoyl,
- (A29) lower alkylcarbamoyloxy(lower)alkyl,
- (A30) lower alkoxycarbonylamino(lower)alkyl,
- (A31) amino(lower)alkyl,
- (A32) lower alkylcarbamoyl(lower)alkyl,
- (A33) heterocyclic-carbonylamino, the heterocyclic group being selected from the above (1) to (14) and optionally being substituted N-protective group,
- (A34) the above heterocyclic groups (1) to (14) being optionally substituted by lower alkyl, and
- (A35) oxo.

Claim 20 (Currently Amended): The compound of claim 19, in which

R1 is lower alkyl, halogen, optionally substituted heterocyclic group, or aryl selected from the group consisting of phenyl and naphtyl;

R2 is carboxy, lower alkoxy carbonyl, hydroxy aminocarbonyl, tetrahydropyran oxyaminocarbonyl, or phenyl(lower)alkylaminocarbonyl, and

m and n are each an integer of 0 or 1, and m+n=1 or 2,

wherein the heterocyclic group is selected from the group consisting of:

- (1) unsaturated 5- or 6-membered heteromonocyclic group containing 1 to 4 nitrogen atoms,
- (2) saturated 5- or 6-membered, heteromonocyclic group containing 1 to 4 nitrogen atoms,
- (3) unsaturated 5- or 6-membered heteromonocyclic group containing 1 to 2 sulfur atoms,
- (4) unsaturated bicyclic 9- or 10-membered, heterocyclic group containing 1 to 5 nitrogen atoms,
- (5) unsaturated 5- or 6-membered heteromonocyclic group containing 1 to 2 oxygen atoms,
- (6) saturated 5- or 6-membered, heteromonocyclic group containing 1 or 2 oxygen atoms,
- (7) unsaturated 5- or 6-membered, heteromonocyclic group containing 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms,
- (8) unsaturated bicyclic 9- or 10-membered, heterocyclic group containing 1 or 2 oxygen atoms,
- (9) unsaturated bicyclic 9- or 10-membered, heterocyclic group containing 1 or 2 sulfur atoms, ~~or~~ and

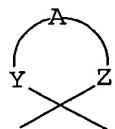
(10) saturated 5- or 6-membered, heteromonocyclic group containing 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms,

wherein the heterocyclic group being optionally substituted by a group selected from the group consisting of the following (B1) to (B8):

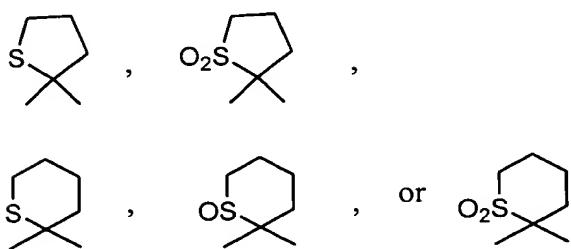
- (B1) lower alkanoyl,
- (B2) lower alkyl,
- (B3) lower alkoxy,
- (B4) lower alkoxy carbonylamino,
- (B5) carbamoyl or lower alkyl carbamoyl,
- (B6) lower alkoxy carbonyl,
- (B7) halo, and
- (B8) oxo;

and the aryl is optionally substituted by a group selected from the group consisting of (A1) to (A35) as defined in claim 19.

Claim 21 (Currently Amended): The compound of claim 20, in which a group of the formula:



is one of the following formulae:



R1 is lower alkyl, halogen, optionally substituted heterocyclic group or aryl selected from the group consisting of phenyl and naphtyl;

R2 is carboxy, lower alkoxy carbonyl, hydroxy aminocarbonyl, or tetrahydropyran oxyaminocarbonyl, and

m and n are each an integer of 0 or 1, and m+n=1 or 2,

wherein the above-mentioned heterocyclic group is

- (1) pyrrolyl, pyrrolinyl, imidazolyl, pyrazolyl, pyridyl, pyridyl N-oxide, pyrimidyl, pyrazinyl, pyridazinyl, triazolyl, tetrazolyl, dihydrotriazinyl,
- (2) azetidinyl, pyrrolidinyl, imidazolidinyl, piperidinyl, piperidino, pyrazolidinyl, piperazinyl,
- (3) thienyl,
- (4) indolyl, isoindolyl, indolizinyl, benzimidazolyl, quinolyl, isoquinolyl, tetrahydroisoquinolyl, indazolyl, benzotriazolyl, tetrazolopyridyl, tetrazolopyridazinyl, dihydrotriazolopyridazinyl,
- (5) furyl,
- (6) oxolanyl,
- (7) oxazolyl, isoxazolyl, oxadiazolyl,
- (8) benzofuranyl, benzodihydrofuran, benzodioxolenyl,
- (9) benzothienyl, dihydrobenzothienyl,
- (10) morpholinyl, or morpholino,

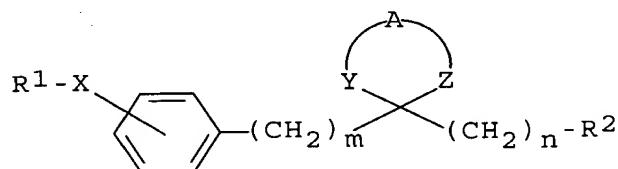
wherein the heterocyclic group being optionally substituted by a group selected from the group consisting of (B1) to (B8) as defined in claim 20, and the aryl is optionally substituted by a group selected from the group consisting of the following (A1) to (A34):

- (A1) halogen,

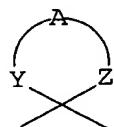
- (A2) lower alkyl,
- (A3) lower alkoxy,
- (A4) halo(lower)alkyl,
- (A5) halo(lower)alkoxy,
- (A6) lower alkenyl,
- (A7) acyl,
- (A8) lower alkylthio, lower alkylsulfinyl, lower alkylsulfonyl,
- (A9) C6-C10 aryl
- (A10) halo(C6-C10)aryl,
- (A11) hydroxy,
- (A12) hydroxy(lower)alkyl or protected hydroxy(lower)alkyl,
- (A13) amino,
- (A14) carboxy,
- (A15) protected carboxy,
- (A16) nitro(lower)alkenyl,
- (A17) lower alkylenedioxy,
- (A18) acylamino,
- (A19) nitro,
- (A20) (C6-C10)aryl(lower)alkoxy,
- (A21) carbamoyl(lower)alkenyl optionally N-substituted by the group consisting of lower alkyl, (C6-C10)aryl, lower alkoxy(C6-C10)-aryl, and halo(C6-C10)aryl,
- (A22) lower alkylaminocarbonyloxy,
- (A23) lower alkanoyloxy,
- (A24) lower alkoxy(lower)alkanoyloxy,
- (A25) lower alkoxycarbonyloxy,

(A26) lower alkenyloxy optionally substituted by the above heterocyclic group (1),
(A27) lower cycloalkanecarbonyloxy,
(A28) lower alkoxy substituted by the group consisting of carboxy, protected carboxy, lower alkanoyl, lower cycloalkanecarbamoyl, and lower alkylcarbamoyl,
(A29) lower alkylcarbamoyloxy(lower)alkyl,
(A30) lower alkoxycarbonylamino(lower)alkyl,
(A31) amino(lower)alkyl,
(A32) lower alkylcarbamoyl(lower)alkyl,
(A33) heterocyclic-carbonylamino, the heterocyclic group being selected from the above (2), (4) and (5) and optionally substituted by N-protective group, and
(A34) the heterocyclic group of the above (7) being optionally substituted by lower alkyl.

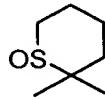
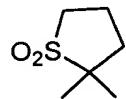
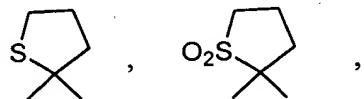
Claim 22 (Previously Presented): The compound of claim 21, having the following formula:



wherein a group of the formula:



is one of the following formulae:

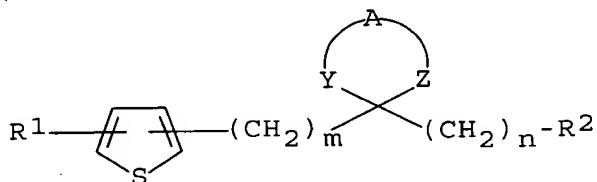


R^1 is lower alkyl, phenyl, halophenyl, or (halo)(phenyl)phenyl,

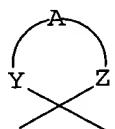
R^2 is carboxy or hydroxyaminocarbonyl, and

m and n are each an integer of 0 or 1, and $m+n=1$.

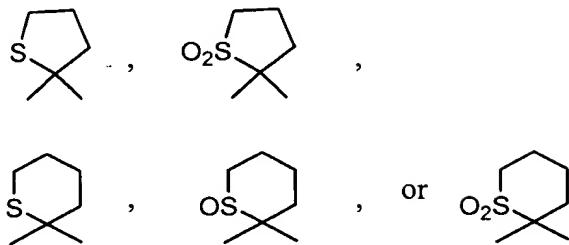
Claim 23 (Currently Amended): The compound of claim 21, having the following formula:



wherein a group of the formula:



is one of the following formulae:



R2 is carboxy or hydroxyaminocarbonyl,

m and n are each an integer of 0 or 1, and m+n=1,

R1 is halogen, heterocyclic group selected from the group consisting of pyridyl, thienyl, furyl, benzofuranyl or benzothienyl, wherein the heterocyclic group is optionally substituted by a group selected from the group consisting of lower alkanoyl, lower alkyl, lower alkoxy, lower alkoxy carbonylamino and lower alkylcarbamoyl; naphtyl or phenyl optionally substituted by a group selected from the group consisting of the following (C1) to (C31):

- (C1) halogen,
- (C2) lower alkyl,
- (C3) lower alkoxy,
- (C4) halo(lower)alkyl,
- (C5) halo(lower)alkoxy,
- (C6) lower alkenyl,
- (C7) lower alkylcarbamoyl, carbamoyl, phenyl(lower)alkylcarbamoyl, lower alkanoyl,
- (C8) lower alkylthio, lower alkylsulfinyl, lower alkylsulfonyl,
- (C9) phenyl, naphthyl,
- (C10) halophenyl,
- (C11) hydroxy,

- (C12) mono- or dihydroxy(lower)alkyl, phenoxy carbonyloxy(lower)alkyl
- (C13) amino,
- (C14) carboxy,
- (C15) lower alkylene dioxy,
- (C16) lower alkanoylamino,
 - phenyl(lower)alkanoylamino, halophenyl(lower)alkanoylamino,
 - lower alkoxy(lower)alkanoylamino,
 - phenoxy(lower)alkanoylamino, lower alkoxy phenoxy(lower)alkanoylamino,
 - lower alkylphenoxy(lower)alkanoylamino,
 - halophenoxy(lower)alkanoylamino,
 - carboxy(lower)alkanoylamino, lower alkoxy carbonyl(lower)alkanoylamino,
 - lower alkyl carbamoyl(lower)alkanoylamino,
 - halo(lower)alkanoylamino,
 - lower alkenyl(lower)alkanoylamino,
 - lower alkoxy(lower)alkanoylamino,
 - phenyl(lower)alkoxy(lower)alkanoylamino,
 - piperidinyloxy(lower)alkanoylamino, N-lower alkoxy carbonyl piperidinyloxy-(lower)alkanoylamino, pyridyloxy(lower)alkanoylamino,
 - hydroxy(lower)alkanoylamino,
 - lower alkanoyloxy(lower)alkanoylamino,
 - lower alkyl carbamoyloxy(lower)alkanoylamino, N,N-di(lower alkyl) carbamoyloxy,
 - piperidino-carbonyloxy(lower)alkanoylamino,
 - phenyl(lower)alkyl carbamoyloxy(lower)alkanoylamino, lower alkoxy carbonyl amino(lower)alkanoylamino,

amino(lower)alkanoylamino, fluorenylmethoxycarbonylamino(lower)-
alkanoylamino,
lower alkylamino(lower)alkanoylamino, [N,N-di(lower
alkyl)amino](lower)alkanoylamino,
[N-lower alkyl-N-(lower alkoxy carbonyl)-amino](lower)alkanoylamino, [N-
lower alkyl-N-(fluorenylmethoxycarbonyl)amino](lower)alkanoylamino,
[N-lower alkyl-N-(mono- or di(lower)-
alkylcarbamoyl)amino](lower)alkanoylamino,
[N-(mono- or di(lower alkyl)carbamoyl)amino](lower)alkanoylamino,
benzoylamino(lower)alkanoylamino, lower
alkanoylamino(lower)alkanoylamino, lower
alkanesulfonylamino(lower)alkanoylamino,
lower alkoxy(lower)alkanoylamino(lower)alkanoylamino,
cyclo(lower)alkyloxycarbonylamino-(lower)alkanoylamino,
pyridylcarbonylamino(lower)alkanoylamino,
morpholinocarbonylamino(lower)alkanoylamino,
phenyl(lower)alkoxyoxycarbonylamino(lower)alkanoylamino,
lower alkoxyphenylsulfonylamino(lower)alkanoylamino,
hydroxy(lower)alkylamino(lower)alkanoylamino,
morpholino(lower)alkanoylamino, oxooxazolidinyl(lower)alkanoylamino,
oxopyrrolidinyl(lower)alkanoylamino,
trimethylhydantoinyl(lower)alkanoylamino,
lower alkenylamino(lower)alkanoylamino,
lower alkoxy(lower)alkylamino(lower)alkanoylamino,
phenyl(lower)alkylamino(lower)alkanoylamino,

pyridyl(lower)alkylamino(lower)alkanoylamino,
lower alkoxycarbonylamino, phenyl(lower)alkoxycarbonylamino,
lower alkoxy(lower)alkoxycarbonylamino,
halo(lower)alkoxycarbonylamino,
amino(lower)alkoxycarbonylamino, phthalimido(lower)alkoxycarbonylamino,
carbamoylamino,
(mono- or di(lower alkyl)carbamoylamino,
naphthylcarbamoylamino,
halophenylcarbamoylamino,
lower alkoxyphenylcarbamoylamino,
lower alkenylcarbamoylamino,
cyclo(lower)alkyl(lower)alkylcarbamoylamino,
phenyl(lower)alkylcarbamoylamino,
halo(lower)alkylcarbamoylamino,
lower alkoxy(lower)alkylcarbamoylamino,
hydroxy(lower)alkylcarbamoylamino, (lower
alkyl)(diphenyl)silyloxy(lower)alkylcarbamoylamino,
carboxy(lower)alkylcarbamoylamino, lower
alkoxycarbonyl(lower)alkylcarbamoylamino,
lower alkylcarbamoyl(lower)alkylcarbamoylamino, or
pyridylcarbamoylamino,
lower alkylsulfonylamino,
lower alkenoylamino,
lower cycloalkanecarbonylamino,
lower alkenyloxycarbonylamino,

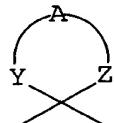
- phenoxy carbonylamino,
- lower alkylthiocarbonylamino,
- (C17) phenyl(lower)alkoxy,
- (C18) lower alkenyl, mono- or di(lower alkyl)carbamoyl(lower)alkenyl, (2-(methylcarbamoyl)ethenyl, 2-(ethylcarbamoyl)ethenyl, 2-(propylcarbamoyl)ethenyl, 2-(isopropylcarbamoyl)ethenyl, 2-(dimethylcarbamoyl)ethenyl,)
phenylcarbamoyl(lower)alkenyl,
- lower alkoxy carbamoyl(lower)alkenyl,
- halophenylcarbamoyl(lower)alkenyl,
- (C19) lower alkylaminocarbonyloxy,
- (C20) lower alkanoyloxy,
- (C21) lower alkoxy(lower)alkanoyloxy,
- (C22) lower alkoxy carbonyloxy,
- (C23) pyridyl(lower)alkenoyloxy
- (C24) lower cycloalkanecarbonyloxy,
- (C25) carboxy(lower)alkoxy,
lower alkoxy carbonyl(lower)alkoxy,
lower alkanoyl(lower)alkoxy,
lower cycloalkanecarbamoyl(lower)alkoxy,
lower alkylcarbamoyl(lower)alkoxy,
- (C26) lower alkylcarbamoyloxy(lower)alkyl,
- (C27) lower alkoxy carbonylamino(lower)alkyl,
- (C28) amino(lower)alkyl,
- (C29) lower alkylcarbamoyl(lower)alkyl,

(C30) furylcarbonylamino, teretahydroisoquinolylcarbonylamino, N-lower
alkoxycarbonyl-teretahydroisoquinolylcarbonylamino,
pyrrolidinylcarbonylamino, and

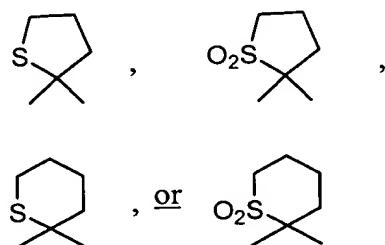
(C31) oxazolyl, lower alkyloxadiazolyl.

Claim 24 (Currently Amended): The compound of claim 23, in which a group of the

formula:



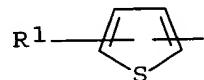
is one of the following formulae:



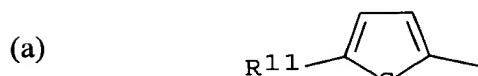
R^2 is hydroxyaminocarbonyl,

m is 0 and n is 1,

a group of the formula:



is a group selected from the group of the following formulae (a) to (e);

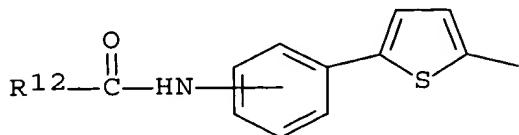


wherein

R¹¹ is halo, naphtyl, phenyl, mono- or dihalophenyl, mono- or di(lower)alkylphenyl, lower alkoxyphenyl, trihalo(lower)alkylphenyl, trihalo(lower)alkoxyphenyl, lower alkenylphenyl, lower alkylcarbamoylphenyl, carbamoylphenyl, phenyl(lower)alkylcarbamoylphenyl, lower alkanoylphenyl, lower alkylthiophenyl, lower alkylsulfinylphenyl, lower alkylsulfonylphenyl, phenylphenyl, (halo)(phenyl)phenyl, halophenylphenyl, hydroxyphenyl, mono- or dihydroxy(lower)alkylphenyl, phenoxy carbonyloxy(lower)alkylphenyl, aminophenyl, carboxyphenyl, lower alkylendioxyphenyl, lower alkanesulfonylaminophenyl, lower alkenoylaminophenyl, lower cycloalkanecarbonylaminophenyl, phenyl(lower)alkoxyphenyl, mono- or di(lower alkyl)carbamoyl(lower)alkenylphenyl, phenylcarbamoyl(lower)alkenylphenyl, lower alkoxy carbamoyl(lower)alkenylphenyl, halophenylcarbamoyl(lower)alkenylphenyl, lower alkylcarbamoyloxyphenyl, lower alkanoyloxyphenyl, lower alkoxy(lower)alkanoyloxyphenyl, lower alkoxy carbonyloxyphenyl, pyridyl(lower)alkenoyloxyphenyl, cyclo(lower)alkylcarbonyloxyphenyl, carboxy(lower)alkoxyphenyl, lower alkoxy carbonyl(lower)alkoxyphenyl, lower alkanoyl(lower)alkoxyphenyl, lower cycloalkanecarbamoyl(lower)alkoxyphenyl, lower alkylcarbamoyl(lower)alkoxyphenyl, lower alkylcarbamoyloxy(lower)alkylphenyl, lower alkoxy carbonylaminolower)alkylphenyl, amino(lower)alkylphenyl, lower alkylcarbamoyl(lower)alkylphenyl, furylcarbonylaminophenyl, 1,2,3,4-tertahydroisoquinolylcarbonylaminophenyl, N-t-butoxycarbonyl 1,2,3,4-tertahydroisoquinolylcarbonylaminophenyl,

pyrrolidinylcarbonylaminophenyl, oxazolylphenyl, or lower
alkyloxadiazolylphenyl.

(b)

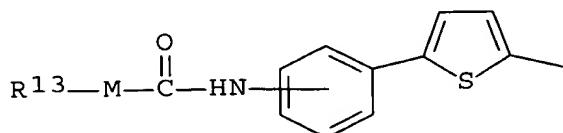


wherein

R^{12} is lower alkyl optionally substituted by a substituents selected from the group
consisting of phenyl, halophenyl, lower alkoxyphenyl, lower alkoxy, phenoxy,
lower alkoxyphenoxy, halophenoxy, lower alkylphenoxy, carboxy, lower
alkoxycarbonyl, lower alkylcarbamoyl, halo, lower alkenyloxy, lower
alkoxy(lower)alkoxy, phenyl(lower)alkoxy, piperidinyloxy, N-lower
alkoxycarbonyl-piperidinyloxy, pyridyloxy, hydroxy, lower alkanoyloxy,
mono- or di(lower)alkylcarbamoyloxy, piperidinylcarbonyloxy,
phenyl(lower)alkylcarbamoyloxy, lower alkoxy carbonylamino, amino,
fluorenylmethoxycarbonylamino, mono- or di(lower)alkylamino, N-lower
alkyl-N-(lower alkoxy carbonyl)amino, N-lower
alkyl-N-(fluorenylmethoxycarbonyl)amino, N-lower alkyl-N-(mono- or
di(lower)alkylcarbamoyl)amino, N-(mono- or di(lower
alkyl)carbamoyl)amino, benzoylamino, lower alkanoylamino, lower
alkanesulfonylamino, lower alkoxy(lower)alkanoylamino,
cyclo(lower)alkyloxycarbonylamino, pyridylcarbonylamino,
morpholinocarbonylamino, phenyl(lower)alkoxycarbonylamino, lower

alkoxyphenylsulfonylamino,
hydroxy(lower)alkylamino, morpholino,
oxooxazolidinyl, oxopyrrolidinyl, trimethylhydantoinyl, pyridyl, lower
alkenylamino, lower alkoxy(lower)alkylamino, phenyl(lower)alkylamino,
pyridyl(lower)alkylamino, and cyclo(lower)alkyl,

(c)



wherein

M is oxygen or sulfur,

R¹³ is lower alkyl, phenyl(lower)alkyl,

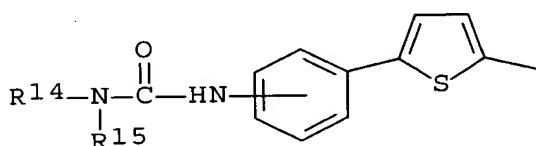
lower alkoxy(lower)alkyl, halo(lower)alkyl,

amino(lower)alkyl, or

phthalimido(lower)alkoxycarbonylamino,

lower alkenyl, or phenyl,

(d)



wherein

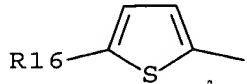
R15 is hydrogen or lower alkyl,

R14 is hydrogen, lower alkyl, naphthyl, halophenyl, lower alkoxyphenyl, lower alkenyl, lower cycloalkyl(lower)alkyl, phenyl(lower)alkyl, halo(lower)alkyl, lower alkoxy(lower)alkyl, hydroxy(lower)alkyl, (lower alkyl)(diphenyl)silyloxy(lower)alkyl, carboxy(lower)alkyl, lower

alkoxycarbonyl(lower)alkyl, lower alkylcarbamoyl(lower)alkyl, or pyridyl,

pyridyl; and

(e)

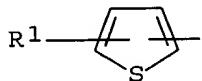


wherein

R16 is benzothienyl, benzofuranyl, thienyl, furyl, lower alkylpyridyl, pyridyl, lower alkoxy pyridyl, lower alkoxy carbonylaminopyridyl, lower alkanoylthienyl, or lower alkylcarbamoylbenzofuranyl.

Claim 25 (Currently Amended): The compound of claim 24, wherein

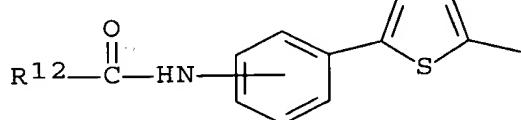
a group of the formula:



is the same group as (a), (c), (d) and or (e) of claim 24, and or the following formula

(b):

(b)



wherein

R¹² is lower alkyl, phenyl(lower)alkyl, halophenyl(lower)alkyl,

lower alkoxyphenyl(lower)alkyl,

lower alkoxy(lower)alkyl, phenoxy(lower)alkyl, lower

alkoxyphenoxy(lower)alkyl, halophenoxy(lower)alkyl,

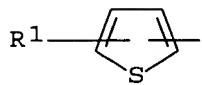
lower alkylphenoxy(lower)alkyl, carboxy(lower)alkyl,

lower alkoxy carbonyl(lower)alkyl,

lower alkylcarbamoyl(lower)alkyl, halo(lower)alkyl, lower
alkenyloxy(lower)alkyl, lower
alkoxy(lower)alkoxy(lower)alkyl,
phenyl(lower)alkoxy(lower)alkyl, piperidinyloxy(lower)alkyl,
N-t-butoxycarbonylpiperidinyloxy(lower)alkyl, pyridyloxy(lower)alkyl,
hydroxy(lower)alkyl,
lower alkanoyloxy(lower)alkyl,
mono- or di(lower)alkylcarbamoyloxy(lower)alkyl,
piperidinylcarbonyloxy(lower)alkyl,
phenyl(lower)alkylcarbamoyloxy(lower)alkyl,
amino(lower)alkyl,
lower alkoxycarbonylamino(lower)alkyl,
fluorenylmethoxycarbonylamino(lower)alkyl,
mono- or di(lower)alkylamino(lower)alkyl,
N-lower alkyl-N-(lower alkoxycarbonyl)amino(lower)alkyl,
N-lower alkyl-N-(fluorenylmethoxycarbonyl)amino-
(lower)alkyl, N-lower alkyl-N-(mono- or di(lower)-
alkylcarbamoyl)amino(lower)alkyl, N-(mono- or di(lower alkyl)carbamoyl)-
amino(lower)alkyl, benzoylamino(lower)alkyl,
lower alkanoylamino(lower)alkyl,
lower alkanesulfonylamino(lower)alkyl,
lower alkoxy(lower)alkanoylamino(lower)alkyl,
cyclo(lower)alkyloxycarbonylamino(lower)alkyl,
pyridylcarbonylamino(lower)alkyl, morpholinocarbonylamino(lower)alkyl,
phenyl(lower)alkoxyoxycarbonylamino(lower)alkyl,

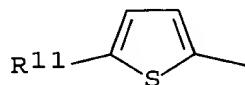
lower alkoxyphenylsulfonylamino(lower)alkyl,
hydroxy(lower)alkylamino(lower)alkyl, morpholino(lower)alkyl,
oxooxazolidinyl(lower)alkyl, oxopyrrolidinyl(lower)alkyl,
trimethylhydantoinyl(lower)alkyl, pyridyl(lower)alkyl, lower
alkenylamino(lower)alkyl, lower alkoxy(lower)alkylamino(lower)alkyl,
phenyl(lower)alkylamino(lower)alkyl, pyridyl(lower)alkylamino(lower)alkyl,
cyclo(lower)alkyl, (amino)(phenyl)(lower)alkylamino, (lower
alkoxycarbonylamino)(phenyl)(lower)alkyl, (amino)(lower alkoxy)-
(lower)alkyl, (lower alkoxy carbonylamino)(lower alkoxy)(lower)alkyl,
(amino)(carboxy)(lower)alkyl, (lower alkoxy carbonylamino)(carboxy)-
(lower)alkyl, (amino)(lower alkoxy carbonyl)(lower)alkyl, (lower
alkoxycarbonylamino)(lower alkoxy carbonyl)(lower)alkyl,
(amino)(phenyl(lower)alkoxy)(lower)alkyl, (lower alkoxy carbonylamino)-
(phenyl(lower)alkoxy)(lower)alkyl, (amino)(pyridyl)(lower)alkyl,
(lower alkoxy carbonylamino)(pyridyl)(lower)alkyl, (amino)(hydroxy)-
(lower)alkyl, (lower alkoxy carbonylamino)(hydroxy)(lower)alkyl,
(amino)(amino)(lower)alkyl,
(lower alkoxy carbonylamino)(amino)(lower)alkyl, (amino)(lower
alkoxycarbonylamino)(lower)alkyl, (lower alkoxy carbonylamino)(lower
alkoxycarbonylamino)(lower)alkyl,
(amino)(lower cycloalkane)(lower)alkyl, or
(lower alkoxy carbonylamino)(lower cycloalkane)(lower)alkyl.

Claim 26 (Currently Amended): The compound of claim 24, in which a group of the
formula:



is a group selected from the group of the following formula (a) to (e):

(a)



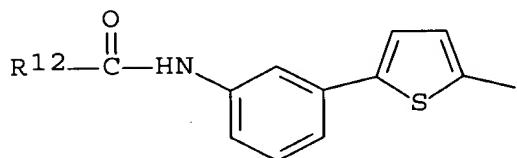
wherein

R11 is bromo, 2-naphthyl, phenyl,
3(or 4)-chlorophenyl, 2(or 3 or 4)-fluorophenyl,
3,4-dichlorophenyl, 3,5-difluorophenyl, 3(or 4)-methylphenyl, 4-ethylphenyl,
4-isopropylphenyl, 4-(t-butyl)phenyl,
3,4-dimethylphenyl, 4-methoxyphenyl,
4-ethoxyphenyl, 4-trifluoromethylphenyl,
4-trifluoromethoxyphenyl, 4-ethenylphenyl,
4-methylcarbamoylphenyl, 4-ethylcarbamoylphenyl,
4-carbamoylphenyl, 4-benzylcarbamoylphenyl,
4-acetylphenyl, 4-methylthiophenyl,
4-ethylthiophenyl, 4-methylsulfinylphenyl,
4-methylsulfonylphenyl, phenylphenyl, 4-phenyl-3-fluorophenyl,
4-(4-fluorophenyl)phenyl, 3(or 4)-hydroxyphenyl, 3(or
4)-hydroxymethylphenyl,
4-(1,2-dihydroxyethyl)phenyl,
4-(phenoxy carbonyloxy methyl)phenyl, 3(or 4)-aminophenyl,
4-carboxyphenyl,
3,4-methylendioxyphenyl,

4-(methanesulfonylamino)phenyl,
3-(2-butenoylamino)phenyl,
3-(cyclopropanecarbonylamino)phenyl,
3-(cyclobutanecarbonylamino)phenyl,
3-(cyclopentanecarbonylamino)phenyl,
4-benzyloxyphenyl,
4-(2-(methylcarbamoyl)ethenyl)phenyl,
4-(2-(ethylcarbamoyl)ethenyl)phenyl,
4-(2-(propylcarbamoyl)ethenyl)phenyl,
4-(2-(isopropylcarbamoyl)ethenyl)phenyl,
4-(2-(dimethylcarbamoyl)ethenyl)phenyl,
4-(2-(phenylcarbamoyl)ethenyl)phenyl,
4-(2-(methoxyphenylcarbamoyl)ethenyl)phenyl,
4-(2-(4-fluorophenylcarbamoyl)ethenyl)phenyl,
4-(methylaminocarbonyloxy)phenyl,
4-(ethylaminocarbonyloxy)phenyl,
4-propanoyloxyphenyl, 4-(methoxyacetoxy)phenyl, 4-(ethoxycarbonyloxy)phenyl,
4-(3-(3-pyridyl)acryloyloxy)phenyl,
4-(cyclopropylcarbonyloxy)phenyl,
4-(carboxymethoxy)phenyl,
4-(ethoxycarbonylmethoxy)phenyl,
4-(t-butoxycarbonylmethoxy)phenyl,
4-(propanoylmethoxy)phenyl,
4-(cyclopropylcarbamoylmethoxy)phenyl,

3(or 4)-(methylcarbamoylmethoxy)phenyl,
4-(ethylcarbamoylmethoxy)phenyl,
4-(propylcarbamoylmethoxy)phenyl,
3(or 4)-(methylcarbamoyloxymethyl)phenyl,
4-(methoxycarbonylaminomethyl)phenyl,
4-(t-butoxycarbonylaminomethyl)phenyl,
4-aminomethylphenyl,
4-(methylcarbamoylmethyl)phenyl,
3-(2(or 3)-furylcarbonylamino)phenyl,
3-(1,2,3,4-teretahydroisoquinolylcarbonylamino)phenyl,
3-(N-(t-butoxycarbonyl)-1,2,3,4-
teretahydroisoquinolylcarbonylamino)phenyl,
3-(pyrrolidinylcarbonylamino)phenyl,
4-(1,3-oxazolyl)phenyl, or
4-(5-methyl-1,2,4-oxadiazol-3-yl)phenyl,

(b)



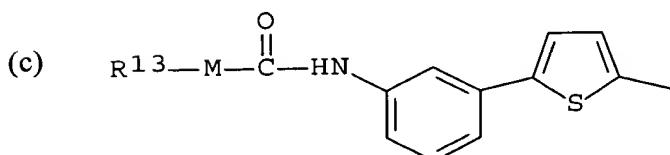
wherein

R12 is methyl, ethyl, propyl, isopropyl, butyl, isobutyl, t-butyl, neopentyl,
phenylmethyl,
4-chlorophenylmethyl, 4-methoxyphenylmethyl,
methoxymethyl, ethoxymethyl, propoxymethyl, butoxymethyl,

isopropyloxymethyl, 1-methoxyethyl, 2-methoxyethyl,
phenoxyethyl, 2-phenoxyethyl, 3(or 4)-methoxyphenoxyethyl,
4-fluoro(or chloro)phenoxyethyl, 3(or 4)-methylphenoxyethyl,
2-carboxyethyl, 2-methoxycarbonylethyl, 2-t-butoxycarbonylethyl,
2-methylcarbamoylethyl,
2-chloroethyl, chloromethyl, allyloxymethyl,
(2-ethoxyethoxy)methyl, benzyloxymethyl,
4-piperidinyloxymethyl, (N-t-butoxycarbonyl-4-piperidinyl)oxymethyl,
3(or4)-pyridyloxymethyl, hydroxymethyl, 2-hydroxyethyl,
acetoxyethyl,
1-acetoxyethyl, methylcarbamoyloxymethyl, 1-(N-methyl-N-
ethylcarbamoyloxy)methyl, (piperidino-carbonyloxy)methyl,
(benzylcarbamoyloxy)methyl,
(t-butoxycarbonylamino)methyl, aminomethyl,
1-aminoethyl, 1-(t-butoxycarbonylamino)ethyl,
2-aminoethyl, methoxycarbonylaminomethyl,
2-(methoxycarbonylamino)ethyl, ethoxycarbonylaminomethyl,
propoxycarbonylaminomethyl,
1-(fluorenylmethoxycarbonylamino)methyl,
2-(t-butoxycarbonylamino)ethyl,
2-(fluorenylmethoxycarbonylamino)ethyl,
1-aminoisopropyl, 1-aminopropyl,
1-(t-butoxycarbonylamino)propyl,
1-(t-butoxycarbonylamino)isopropyl,
1,5-diaminopentyl, 1,5-bis(t-butoxycarbonylamino)-pentyl,

methylaminomethyl, ethylaminomethyl,
(N-methyl-N-ethylamino)methyl,
dimethylaminomethyl, pentylaminomethyl,
t-butylaminomethyl, methylaminoethyl,
3-(2-(N-methyl-N-methoxycarbonylamino)methyl,
1-(N-methyl-N-t-butoxycarbonylamino)methyl,
1-(N-ethyl-N-t-butoxycarbonylamino)methyl,
2-(N-methyl-N-(fluorenylmethoxycarbonyl)amino)-ethyl,
2-(N-methyl-N-(t-butoxycarbonyl)amino)ethyl, 1-(N-methyl-N-(dimethylcarbamoyl)amino)methyl,
1-(dimethylcarbamoylamino)methyl,
1-(N-(ethylcarbamoyl)amino)methyl,
2-(N-(ethylcarbamoyl)amino)ethyl, benzoylaminomethyl, 2-benzoylaminooethyl, acetylaminomethyl, isobutyrylaminomethyl,
pivaloylaminomethyl,
1-(methanesulfonylamino)methyl,
2-(methanesulfonylamino)ethyl, methoxyacetylaminomethyl,
cyclopentyloxycarbonylaminomethyl,
pyridylcarbonylaminomethyl, morpholinocarbonylaminomethyl,
benzyloxycarbonylaminomethyl,
1-(4-methoxyphenylsulfonylamino)methyl,
1-(2-hydroxyethylamino)methyl,
morpholinomethyl, 1-(2-oxo-1,3-oxazolidin-1-yl)methyl,
1-(2-oxopyrrolidin-1-yl)methyl,
1-(3,4,4-trimethylhydantoin-1-yl)methyl, allylaminomethyl, 1-(2-

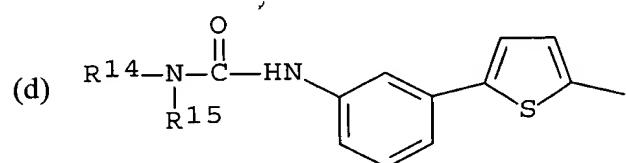
ethoxyethylamino)methyl,
benzylaminomethyl, 1-(3-pyridylmethylamino)methyl,
2-phenyl-1-aminoethyl, 1-amino-1-phenylmethyl,
1-t-butoxycarbonylamino-1-phenylmethyl,
1-amino-2-phenylethyl, 1-t-butoxycarbonylamino-2-phenylethyl,
1-amino-2-methoxyethyl,
1-t-butoxycarbonylamino-2-methoxyethyl, 1-amino-3-carboxypropyl,
1-t-butoxycarbonylamino-3-carboxypropyl,
1-amino-3-(t-butoxycarbonyl)propyl,
1-t-butoxycarbonylamino-3-t-butoxycarbonylpropyl, etc.), 1-amino-2-benzyloxyethyl,
1-t-butoxycarbonylamino-2-benzyloxyaminoethyl,
1-amino-2-(3-pyridyl)ethyl,
1-t-butoxycarbonylamino-2-(3-pyridyl)ethyl, 1-amino-2-(4-pyridyl)ethyl,
1-t-butoxycarbonylamino-2-(4-pyridyl)ethyl,
1-amino-2-hydroxyethyl,
1-t-butoxycarbonylamino-2-hydroxyethyl,
(1,5-diaminopentyl, 1-t-butoxycarbonylamino-5-aminopentyl,
1,5-bis(t-butoxycarbonylamino)pentyl,
1-amino-5-(t-butoxycarbonylamino)pentyl, 1-amino-2-cyclohexylethyl, or
1-t-butoxycarbonylamino-2-cyclohexylethyl,



wherein

M=O and R13 is methyl, ethyl, propyl, isopropyl, benzyl, 2-methoxyethyl, 2-chloroethyl, 2-aminoethyl, 2-phthalimidoethyl, allyl, ~~phenyl, or or phenyl; or~~

M=S and R13 is methyl or ethyl methyl, ethyl,

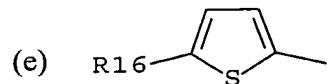


wherein

R15 is hydrogen and

R14 is hydrogen, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, pentyl, hexyl, 1-naphthyl, 3(or 4)-chlorophenyl, 3-methoxyphenyl, allyl, cyclohexylmethyl, benzyl, 2-chloroethyl, methoxymethyl, 2-methoxyethyl, 2-hydroxyethyl, 2-((t-butyl)(diphenyl)silyloxy)ethyl, carboxymethyl, ethoxycarbonylmethyl, methylcarbamoylmethyl, or 3-pyridyl,

R14 is ethyl and R15 is methyl, and



wherein

R16 is 2-benzothienyl, 2-benzofuranyl, 2(or 3)-thienyl, 2-furyl, 3-pyridyl, 1-methyl-4-pyridyl, 6-methyl-3-pyridyl,

6-methoxy-3-pyridyl, 5-methoxycarbonylamino-3-pyridyl, 5-acetyl-2-thienyl, or
2-methylcarbamoyl-5-benzofuranyl.

Claim 27 (Previously Presented): A pharmaceutical composition which comprises the compound of Claim 18 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier or excipient.

Claim 28 (Previously Presented): A process for preparing a pharmaceutical composition which comprises admixing the compound of Claim 18 or a pharmaceutically acceptable salt thereof with a pharmaceutically acceptable carrier or excipient.

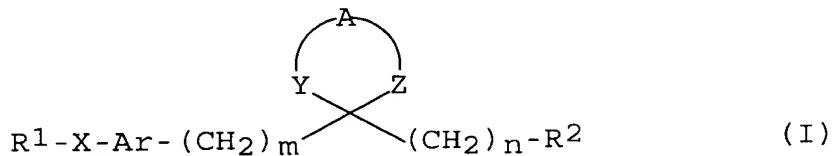
Claim 29 (Currently Amended): A method for treating, ~~reducing, arresting, or~~ alleviating matrix metalloproteinases (MMP) or tumor necrosis factor α (TNF α)-mediated disease, the method comprising administering to a patient in need thereof, a therapeutically effective amount of the compound of Claim 18 or a pharmaceutically acceptable salt thereof, wherein the matrix metalloproteinases (MMP) or tumor necrosis factor α (TNF α)-mediated disease is selected from the group consisting of arthritis, cerebral disease, tissue ulceration, abnormal wound healing, periodontal disease, bone disease, tumor metastasis, tumor invasion, HIV-infection, autoimmune disease, and sepsis.

Claim 30 (Cancelled).

Claim 31 (Currently Amended): A process for manufacturing a ~~medicament~~ the pharmaceutical composition of Claim 27, said process comprising contacting mixing the compound of ~~Claim 18~~ or a pharmaceutically acceptable salt thereof with a ~~the~~ pharmaceutically acceptable carrier.

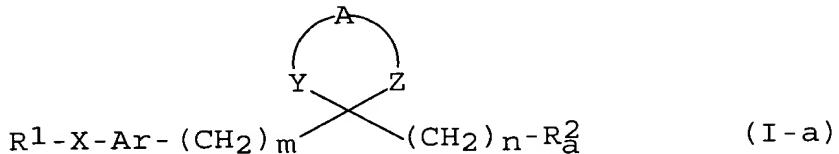
Claims 32-35 (canceled).

36. (New): A process for the preparation of a compound of the formula:

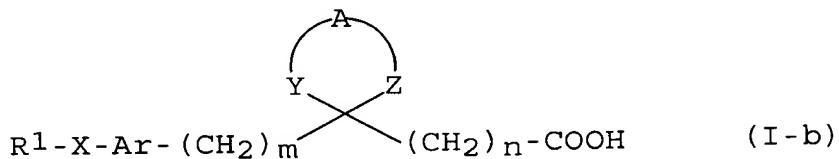


in which R^1 , R^2 , Ar , A , X , Y , Z , m and n are each as defined in Claim 18,
which comprises

(1) subjecting a compound of the formula:



or a salt thereof to removal reaction of the carboxy-protective group, to give a compound of the formula:



or a salt thereof.

37. (New) The method of Claim 39, wherein the matrix metalloproteinases (MMP) or tumor necrosis factor α (TNF α)-mediated disease is arthritis.